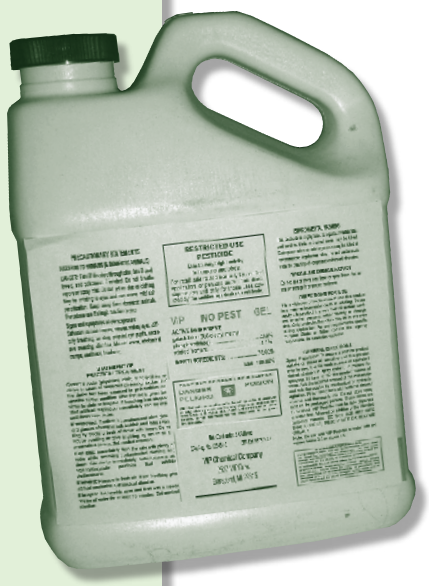
CHAPTER 3

PESTICIDE LABELING

LEARNING OBJECTIVES

After studying this chapter, you should:



- Know how to distinguish between federal registrations, state registrations, special local need registrations, experimental use permits, and emergency exemptions.
- Know how to identify the common, chemical, and brand names of pesticides on their labels.
- Know how to identify the percentage of active ingredient in a formulation.
- Know how to determine who may use a pesticide and how it may be used on the basis of its use classification (i.e., restricted, unclassified).
- Understand relative hazard levels associated with pesticides whose labels contain the following signal words: DANGER—POISON, DANGER, WARNING, and CAUTION.
- Know how to interpret and follow label instructions (i.e., "directions for use"), warnings, terms, symbols, restrictions, and precautions.
- Know how to interpret and follow personal protective equipment statements and practical treatment/first-aid statements.
- Know how to interpret descriptions of environmental, physical, or chemical hazards and follow necessary precautions.
- Know how to interpret and follow mixing and loading, storage, and disposal statements.
- Know how to interpret and follow directions on restricted-entry statements, early-entry exceptions, preharvest intervals, and plantback/recropping limitations.
- Know how to access and interpret other documents and label referrals (e.g., pest control specialists, Extension agents) about pesticide uses.
- Know how to obtain and review information on material safety data sheets (MSDS).

The pesticide product **label** is the main method of communication between a pesticide manufacturer and pesticide users. The information printed on or attached to the pesticide container is the label. ***By law, pesticide users are required to comply with all the instructions and use directions found on the pesticide product label.*** **Labeling,** on the other hand, includes the label itself plus all other information referenced on the label or received from the manufacturer about the product when you buy it. The labeling may include brochures, leaflets, and other information that accompanies the pesticide product. Pesticide labeling gives you instructions on how to use the product safely and correctly.

EPA APPROVAL OF PESTICIDE LABELING

Larry Schulze, Univeristy of Nebraska

No pesticide may be sold in the U.S. before it has been reviewed by EPA.

No pesticide may be sold in the United States until the federal Environmental Protection Agency (EPA) has reviewed the manufacturer's application for registration and determined that the use of the product does not present an unreasonable risk to humans, wildlife, or the environment. As part of the registration process, the EPA must approve all language that the manufacturer (registrant) proposes to include in the product labeling. Exceptions to this are covered under a specific exemption (see "Minimum-Risk Pesticides" section in this chapter).

The EPA reviews the labeling to make sure it contains all the information needed for safe and effective use of the pesticide product and that the information is backed up by data submitted (or cited) by the manufacturer. The EPA may require the manufacturer to change the labeling if the information is incomplete or incorrect.

The liaison between the EPA and the registrant is the EPA product manager. The role of the product manager is to coordinate the agency's internal review and to monitor the status of the registration. The product manager also facilitates discussion among agency scientists and helps resolve problems that occur during the registration process. The EPA's policy of delegating to one product manager the responsibility for the complete documentation of data on a specific **active ingredient** allows an individual to view the whole picture—i.e., health and safety issues, environmental and wildlife concerns, and product chemistry. Equally important, the product manager helps to coordinate an open line of communication among the EPA, the registrant, and the public.

Only after the EPA has reviewed the labeling and registered the product can a pesticide product be sold for use. If the manufacturer wants to change the information on the labeling after the product and labeling are registered, the EPA must approve the change.

THE LABEL

One of the more important tools for the safe and effective use of pesticides is the product label. Pesticide manufacturers are required by law to put certain information on the label. Failure to heed and follow that information can result in a pesticide accident and legal action against the violator. Labels are legal documents providing directions on how to mix, apply, store, and dispose of pesticide products.

Background of the Label

To appreciate the value of the information on a pesticide label, one must consider the time, effort, and money spent to gather it. The information on a product label is the result of years of research. This information takes a minimum of six years to obtain and costs a chemical company millions of dollars. Chemical companies continually make new compounds and then

screen them for possible pesticide use. For every new pesticide that successfully meets the standards, thousands of other compounds are screened and discarded for various reasons. Once a promising pesticide is discovered, its potential application must be evaluated. If a company believes it has a worthwhile product and a strong possibility exists for a significant sales market, it begins wide-scale testing and label registration procedures. In the development and labeling of a pesticide, the manufacturer is interested in proving not only that the chemical controls the pests but also that it does not cause unreasonable adverse effects. Many kinds of carefully controlled tests are conducted to determine the effectiveness and safety of each pesticide under a wide range of environmental conditions.

Toxicity and Toxicological Tests

How poisonous or dangerous is a pesticide to humans, wildlife, and other organisms? Does the chemical cause any long-term (chronic) effects? Does the chemical cause any skin (dermal) reactions? To determine these and other health effects, researchers administer the pesticide at various dosages to test animals, usually rats and mice. These toxicological tests alone often cost a company several million dollars to complete.

Efficacy or Performance Tests

Does the pesticide control the target pest? The company must have performance data to show that the pesticide controls a particular pest or group of pests on one or more hosts or sites, including plants, animals, soil, and structures. Data must show that the pesticide, when used for its intended purpose and according to directions, is a useful product.

Information is also needed on crop varieties, soil types, application methods and rates, and number of required applications. Tests must show that the pests are controlled, crops or animals are not injured, yield and/or quality has been improved, and that the pesticide definitely provides a worthwhile benefit.

Degradation, Mobility, and Residue Tests

What happens to the pesticide after it is applied? A series of studies is needed to show how long it takes for the compound to break down (degrade) into harmless materials under various conditions. In addition, it is important to know if the pesticide moves through the soil into groundwater or if it moves into the plant from treated soil.

Residue studies are conducted for each method of application on each treated crop or animal. These tests determine how much, if any, of the pesticide residue or its breakdown products remains on or in the crop or animal at the time of harvest or slaughter. From these data, the number of days from the last pesticide application until harvest or slaughter is determined. For each pesticide used on a crop or commodity, the EPA establishes a residue **tolerance,** which is the maximum amount of a pesticide residue that may legally remain on or in food or feed at harvest or slaughter. Tolerances are expressed in parts per million (ppm). For example, the tolerance for carbaryl (Sevin) insecticide on blackberries is 12 ppm; on blueberries, 10 ppm; but only 5 ppm in poultry. Pesticide residues on or in food or feed commodities must not exceed the residue tolerances when the crop or animal (including meat, milk, and eggs) is ready for market or livestock feeding.

Although specific tolerances are not included on product labels, **preharvest intervals** (days to harvest) and/or **preslaughter** intervals (days to slaughter) are often listed on labels of agricultural pesticides. These are the minimum number of days that must pass between the last application of a pesticide and the harvest of crops or the slaughter of livestock. Intervals are set by the EPA to allow time for the pesticide to break down on crops or in livestock. Adhering to these intervals prevents residues greater than EPA-approved tolerances on food, feed, or animal products. Food safety is a concern if residues exceed the EPA tolerance or if residues are found on commodities that do not have a tolerance. Under these conditions, the commodity may be condemned and destroyed.

Effects on Wildlife and the Environment

The company must determine the effects of field applications of the pesticide on wildlife and the environment. Any potentially harmful effects on wildlife and the environment that are recognized during these studies must be included in the environmental impact statement submitted to the EPA.

TYPES OF PESTICIDE REGISTRATION

Section 3 Registrations

You are responsible for applying only pesticides registered or exempted from registration by the EPA and your respective state, territory, or tribe. You may encounter two major types of EPA registrations—Section 3 standard registration or Section 24(c) special local need. In addition, the EPA also allows emergency exemptions from registration (Section 18).

Potential adverse effects of pesticides to wildlife and the environment must be included in environmental impact statements submitted to EPA.

Federal EPA or Section 3 registrations are the most common. Section 3 registrations are granted under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Look for the official EPA registration number that must appear on the label (except for products that the EPA classifies as minimum-risk pesticides) to be sure you are buying an approved product.

Occasionally pest problems arise that cannot be managed with currently registered pesticides. Sometimes the commodity, target, or site is not on the registered pesticide label. In some situations, you can request a special local need (SLN) registration or an emergency exemption.

Special Local Need Registrations

Special local need (SLN) registrations are categorized as 24(c) registrations. They allow states to expand or limit the uses of certain registered pesticides within their jurisdictions. For instance, some SLNs allow uses of pesticides for crops or sites not listed on the label. Others add limitations to the uses of a federally registered pesticide to accommodate area-specific conditions. Manufacturers must provide **supplemental labeling** for each SLN registration.

You must have the SLN labeling in your possession to use the pesticide for that purpose. The registration numbers of special local need labeling include the SLN number and the code for the state issuing the registration. These registrations are legal only in the region, state, or local area specified in the labeling. Applying a pesticide that has an SLN registration from another state or region makes you subject to civil and criminal penalties.

Emergency Exemptions

Emergency exemptions address pest problems for which no pesticides are registered. The EPA can issue an emergency exemption at the request of the state regulatory agency. First, the state must acknowledge the need and consider it appropriate. Usually these needs are based on specific public health quarantine emergencies or crises that require the use of an unregistered pesticide. There must be no feasible alternative to the exemption. Known as a **Section 18 exemption,** it allows the sale and use of a certain pesticide product for a specific non-registered purpose during a specified period of time.

Regulations impose strict controls

and require record keeping for all emergency uses. You must understand the special requirements and responsibilities involved whenever you use pesticides with emergency exemptions. The state pesticide regulatory agency prescribes application rates, safety precautions, and other vital application information. Applicators must have a copy of the Section 18 approval in their possession to legally use the product. Although they are often referred to as "labels" or "labeling," Section 18 use instructions are not true labels. The products have not been registered by the EPA. Applicators can, however, follow the instructions found on a copy of the EPA approval letter to the state authorizing the Section 18 exemption.

Minimum-risk Pesticides

In 1996, the EPA exempted from registration certain pesticides considered to pose minimum risk to humans and the environment, provided the products satisfy certain conditions. These products were exempted partly on the basis of their minimum-risk status and partly as an effort by the EPA to reduce the cost and regulatory burden on businesses. In addition, this allowed the EPA to focus its limited resources on pesticides that pose a greater risk.

Products identified as exempt under Section 25(b) of FIFRA do not require EPA label approval and do not undergo review by the agency. Furthermore, they have no label requirements for an EPA registration number, an EPA establishment number, any signal word, or any **personal protective equipment (PPE).**

To qualify for a Section 25(b) exemption from registration, each of the active ingredients in any such product must be on a list of specified minimal-risk active ingredients. In addition, any inert ingredients in these products must also be listed as minimal-risk inert ingredients.

Label requirements were established by the EPA for minimum-risk pesticides. Product labels may not claim to control microorganisms that pose a threat to human health. For example, the label may list a pest such as a mosquito or tick, but it must not claim to control any microorganisms that the pest transmits to humans.

Each state has its own statutes and regulations on pesticide registration. Many states do not permit the sale of a Section 25(b) product unless it is first registered in the state. You need to check with your state regulatory agency on the registration and use requirements of Section 25(b) products.

Tom Bowman, N.C. Dept. of Agric. & Consumer Services

Always read the label prior to purchasing and using the pesticide.

WHEN TO READ THE PESTICIDE LABEL

Applicators should read the pesticide label and supplemental labeling thoroughly:

- **Before buying the pesticide.** Make sure the pesticide is registered for your intended use. Confirm that there are no restrictions or other conditions that prohibit using this pesticide at the application site. Be certain its use is suitable for weather conditions at the time of application. Also, be sure it controls the appropriate life stage of your pest. Find out what personal protective equipment and special application equipment will be needed.
- **Before mixing and applying the pesticide.** Learn how to mix and apply the material safely. Find out what precautions to take to prevent exposure to people and non-target organisms. Learn what first aid and medical treatments are necessary should an accident occur.
- **When storing pesticides.** Find out how to store the pes-

ticide properly. Understand the special precautions to prevent fire hazards.

- **Before disposing of unused pesticides and empty containers.** Learn how to prevent environmental contamination and hazards to people. Before disposal, check with your state pesticide regulatory agency for any disposal restrictions and requirements, and find out whether your state has pesticide container recycling and waste disposal programs available.

PARTS OF THE LABEL

Some labels are easy to understand; others are complicated. It is the user's responsibility to read and understand the label before buying, using, storing, or disposing of a pesticide. Each of the label components will be discussed in this section. See Figure 3.1 (on page 44) for an example of a pesticide label.

Trade, Brand, or Product Name

Every manufacturer has trade names for its products. Most companies register each trade name as a trademark and will not allow any other company to use that name without permission. Various manufacturers use different trade names, even though the products contain the same active ingredient. The brand or trade name shows up plainly on the front panel of the label and is the one used in advertisements and by company salespeople.

The brand name often indicates the type of formulation and the percentage of active ingredient present. For example, "Sevin 50WP" is a brand name. Sevin is the registered trade name, and the formulation is a wettable powder containing 50 percent active ingredient.

Ingredient Statement

Every pesticide label must list the active ingredients and the percentage of each active ingredient found in that particular product. The **active ingredient,** or simply the a.i., is the chemical or chemicals in a pesticide product responsible for the pesticidal activity. It is the material in a pesticide formulation that actually destroys a pest or performs a desired function (e.g., repellent, growth regulator). **Inert ingredients** are not usually named, but the label must show what percentage of the total contents they make up. The ingredient statement must list the official chemical names and/or common names of the active ingredients. Let's look at the following Sevin insecticide example:

SEVIN 50WP

Active Ingredient:
Carbaryl (1-naphthyl N-methyl carbamate). **50%**

Inert Ingredients. **50%**

The **chemical name** is the complex name that identifies the chemical components and structure of the pesticide's active ingredient. This name must be listed in the ingredient statement on the label. For example, the chemical name of Sevin is 1-naphthyl N-methyl carbamate.

Because chemical names or active ingredients are usually complex, many are given a shorter **common name.** Only those common names officially accepted by the EPA may be used in the ingredient statement on the pesticide label. The official common name is usually followed by the chemical name in the list of active ingredients. The common name for Sevin is carbaryl. By purchasing pesticides according to the common or chemical names, you are certain of getting the right active ingredient, no matter what the brand name or formulation.

EXAMPLE OF AN INGREDIENT STATEMENT

Active ingredients:

Isoctyl (2-ethylhexyl) ester of 2,4-dichlorophenoxyacetic acid **32.45%**

2-ethylhexyl ester of (+)-r-2-(2,4-dichlorophenoxy) propionic acid **15.90%**

Dicamba: 3,6-dichloro-o-anisic acid **5.38%**

Inert Ingredients: 46.27%

Total 100.00%

Use Classification Statement

Currently, the EPA classifies every pesticide product as either **restricted use** or **unclassified/general use.** Every product that is federally classified as a restricted-use pesticide must include the following statement at the top of the front panel of the pesticide label:

RESTRICTED-USE PESTICIDE

For retail sale to and use only by certified applicators or persons under their direct supervision and only for those uses covered by the certified applicator's certification.

Pesticides labeled for restricted use warrant special attention. Many pesticides are designated as restricted-use products if there is reason to believe they could harm humans, livestock, wildlife, or the environment, even when used according to label directions. The restricted-use statement indicates the specific hazard of that pesticide. For example, a product may be very toxic to humans and wildlife or pose a groundwater hazard. Persons using these products must be certified or have received special training and have demonstrated a certain level of competence to ensure that they can handle these pesticides properly.

Unclassified pesticides are commonly referred to as general-use pesticides. Typically they have a lower toxicity with less potential than restricted-use pesticides to harm humans or the environment. They can be purchased and used by the general public without special permits or restrictions.

Type of Pesticide

The type of pesticide is usually listed on the front panel of the pesticide label. This short statement indicates in general terms what the product controls. Examples:

- Insecticide for control of certain insects on fruits, nuts, and ornamentals.
- Herbicide for the control of woody brush and weeds.
- Insecticide for broad-spectrum control of crawling, flying, and wood-infesting insect pests on indoor and outdoor surfaces, as well as pests of trees, landscape ornamentals, and residential and commercial lawns.

Net Contents

The pesticide label must show how much product is in the container. This is expressed as pounds or ounces for dry formulations or as gallons, quarts, or pints for liquids. Liquid formulations may also list the pounds of active ingredient per gallon of product. Many labels now also include metric units (grams, kilograms, liters) as part of the contents information.

Name and Address of Manufacturer

The law requires that the manufacturer or formulator of a product put the name and address of the company on the label. This is so you know who made or sold the product.

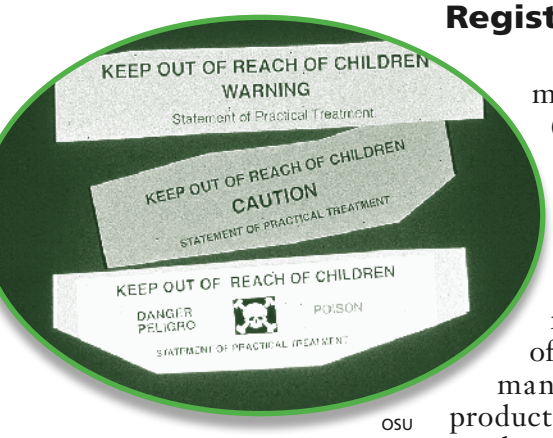
Emergency Telephone Number

Many pesticide manufacturers include an emergency telephone number on their product labels. These

companies are ready to assist anyone in the event of an emergency (poisoning, spill, fire) involving their products.

Registration Numbers

An EPA registration number must appear on all pesticide labels (except Section 25(b) labels). The EPA registration number indicates that the pesticide product has been registered and its label approved by the EPA. Most EPA registration numbers include just two sets of numbers, which identify the manufacturer and the specific product. Occasionally a third set of numbers is included. This is a distributor's identification number and appears only on labels of distributor products. In cases of a special local need, pesticide products may be approved for use in a specific state. This will be indicated in the registration number.



OSU

Signal words indicate the relative acute toxicity of the product to humans and animals.

EXAMPLES OF EPA REGISTRATION NUMBERS

EPA Reg. No. 3120-280-1492

"3120" identifies the manufacturer, "280" identifies the specific product, and "1492" identifies the distributor.

EPA SLN No. PA-990005

SLN indicates "special local need," PA means that the product is registered for use in Pennsylvania, "99" means it was registered in 1999, "0005" means it was the fifth special local-need product registered that year in Pennsylvania.

Establishment Number

An EPA establishment number (for example, EPA Est. No. 5840-AZ-1) must also appear on the pesticide label to identify the facility that produced the product. This is necessary in case a problem arises or the product is found to be adulterated in any way. The AZ in the establishment number indicates the product was manufactured in a specific facility in Arizona.

Signal Words and Symbols

Most pesticide labels must include a **signal word.** This important designation gives the user an indication of the relative acute toxicity of the product to humans and animals. The signal word must appear in large letters on the front panel of the pesticide label along with the statement "Keep Out of Reach of Children." Very low toxicity pesticides (Toxicity Category IV) are no longer required to display a signal word, although many manufacturers still include a "caution" signal word on the label of these products. The following signal words may be found on most pesticide labels:

- **DANGER—POISON,** *skull and crossbones symbol*—these words and symbol must appear on all products that are highly toxic by any route of entry into the body. The word "poison" must appear in red. They can cause death in very low doses. **PELIGRO,** the Spanish word for "**DANGER**," must also appear on the label.
- **DANGER**—products with this signal word can cause severe eye damage or skin irritation.
- **WARNING**—this word signals that the product is moderately toxic either orally, dermally, or through inhalation, or causes moderate eye and skin irritation. **AVISO,** the Spanish word for "**WARNING**," must also appear on the label.
- **CAUTION**—this word signals that the product is slightly toxic either orally, dermally, or through inhalation, or causes slight eye and skin irritation.

Signal words should be used to choose the least toxic chemical that provides the desired level of pest control.

Precautionary Statements

All pesticide labels contain additional statements to help applicators decide what precautions to take to protect themselves, their employees, and other persons (or animals) that could be

exposed. Sometimes these statements are listed under the heading "Hazards to Humans and Domestic Animals." These statements may be included in several sections of the label.

Routes of Entry Statements

These statements indicate which route or routes of entry (mouth, skin, lungs) are particularly hazardous. Many pesticide products are hazardous by more than one route, so study these statements carefully. A **DANGER** signal word followed by "May be fatal if swallowed or inhaled" gives you a far different warning than **DANGER** followed by "Corrosive—causes eye damage and severe skin burns."

Typical **DANGER** label statements include:

- Fatal if swallowed.
- Poisonous if inhaled.
- Extremely hazardous by skin contact—rapidly absorbed through skin.
- Corrosive—causes eye damage and severe skin burns.

Routes of entry statements are not uniform on all labels; many variations are found. More than one or even all four precautions may appear on a label.

Typical **WARNING** label statements include:

- Harmful or fatal if swallowed.
- Harmful or fatal if absorbed through the skin.
- Harmful or fatal if inhaled.
- Causes skin and eye irritation.

Typical **CAUTION** label statements include:

- Harmful if swallowed.
- May be harmful if inhaled.
- May irritate eyes, nose, throat, and skin.

Specific Action Statements

These statements usually follow the route of entry statements. The specific action statements recommend specific precautions to take and protective clothing and equipment to wear to reduce exposure to the pesticide. These statements are directly related to the toxicity of the pesticide product (signal word) and the routes of entry. **DANGER** labels typically contain statements such as:

- Do not breathe vapors or spray mist.
- Do not get on skin or clothing.
- Do not get in eyes.

Typical **WARNING** labels often combine specific action statements from **DANGER** and **CAUTION** labels.

CAUTION labels generally contain specific action statements that are less threatening than those on the **DANGER** label, indicating that the toxicity hazard is not as great:

- Avoid contact with skin or clothing.
- Avoid breathing dust, vapors, or spray mists.
- Avoid getting in eyes.

Protective Clothing and Equipment Statements

Pesticide labels vary in the type of information they contain on protective clothing and equipment. Some labels carry no such statement at all. Other pesticide labels fully describe appropriate protective clothing and equipment. A few list the kinds of respirators that must be worn when handling and applying the product; others require the use of a respirator but do not specify a type or model. Follow all advice on protective clothing or equipment that appears on the label. Note that the lack of such a statement or the mention of only one piece of equipment does not rule out the need for additional protection. To determine the proper type of protective

Follow label instructions on the use of protective clothing and equipment.

clothing and equipment needed, consider the signal word, the route of entry statements, and the specific action statements. Read the basic guidelines described in Chapters 5 and 6.

Other Precautionary Statements

Labels often list other precautions that should always be followed when handling the product. These are self-explanatory:

- Do not contaminate food or feed.
- Remove and wash contaminated clothing before reuse.
- Wash thoroughly after handling and before eating or smoking.
- Wear clean clothes daily.
- Not for use or storage in and around a house.
- Do not allow children or domestic animals into the treated area.

These are commonsense statements. The absence from the label of such statements *does not* indicate that these precautions should be ignored.

PRECAUTIONARY STATEMENTS

Hazard to Humans and Domestic Animals
WARNING/AVISO

This product may cause skin sensitization reactions in certain individuals. Causes eye irritation. Do not get in eyes, on skin, or on clothing. Harmful if swallowed, inhaled, or absorbed through skin. Avoid breathing spray mist.

STATEMENT OF PRACTICAL TREATMENT

If in eyes: Flush with plenty of water. Get medical attention if irritation persists.

If on skin: Wash with plenty of soap and water. Get medical attention if irritation persists.

If swallowed: Do not induce vomiting. Promptly drink a large quantity of milk, egg whites, or gelatin solution. If these are not available, drink large quantities of water. Never give anything by mouth to unconscious person. Call a physician or Poison Control Center immediately.

If inhaled: Move victim to fresh air.

Be familiar with first aid procedures before using the pesticide.

Statement of Practical Treatment

This section lists first-aid treatments recommended in case of poisoning or accidental exposure. Typical statements include:

- In case of contact with skin, wash immediately with plenty of soap and water.
- In case of contact with eyes, flush with water for 15 minutes and get medical attention.
- In case of inhalation exposure, remove victim from contaminated area and give artificial respiration, if necessary.
- If swallowed, induce vomiting.

All **DANGER** labels and some **WARNING** and **CAUTION** labels contain a note to physicians describing the appropriate medical procedures and antidotes for poisoning emergencies. The label should always be available in emergencies.

Environmental Hazards

Pesticides can be harmful to the environment. Some products are classified as restricted use because of their environmental hazards. Watch for special warning statements on the label concerning hazards to the environment.

Special Toxicity Statements

If a particular pesticide is especially hazardous to wildlife, the label will say that. For example:

- This product is highly toxic to bees.
- This product is extremely toxic to fish and aquatic invertebrates.
- This product is toxic to birds and other wildlife.

These statements alert pesticide users to the special hazards a product poses. They should help applicators choose the safest product for a particular job and remind them to take extra precautions.

General Environmental Statements

Some of these statements appear on virtually every pesticide label. They are reminders to follow certain commonsense procedures to avoid contaminating the environment. The absence of any or all of these statements does not mean that you do not need to take adequate precautions. Sometimes

these statements follow a specific toxicity statement and provide practical steps to avoid harm to wildlife. Examples of general environmental statements include:

- Do not apply when runoff is likely to occur.
- Do not apply when weather conditions favor drift from treated areas.
- Do not contaminate water by improperly disposing of rinse water and other pesticide wastes.
- Do not apply when bees are likely to be in the area.
- Do not apply directly to water or to areas where surface water is present or to intertidal areas below the mean high water mark.
- The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

Physical or Chemical Hazards

This section of the label describes any special fire, explosion, or chemical hazards the product may pose. For example:

- **Flammable**—do not use, pour, spill, or store near heat or open flame. Do not cut or weld container.
- **Corrosive**—store only in a corrosion-resistant tank.

Hazard statements (hazards to humans and domestic animals, environmental hazards, and physical or chemical hazards) are not located in the same place on all pesticide labels. Some labels group them under the headings listed above. Other labels list them on the front panel beneath the signal word. Still other labels list the hazards in paragraph form somewhere else on the label under headings such as "Note" or "Important." Before using a pesticide, examine the label carefully for these statements to ensure that you handle the product properly and safely.

EXAMPLE OF AN ENVIRONMENTAL STATEMENT

Environmental Hazards

This product is toxic to aquatic invertebrates. Drift and runoff may be hazardous to aquatic organisms in neighboring areas. Under some conditions, this chemical may also have a high potential for runoff into surface water for several weeks or months after application. Do not cultivate within 10 feet of aquatic areas so as to allow growth of vegetative filter strip. Drift from applications of this pesticide is likely to result in damage to sensitive aquatic invertebrates in water bodies adjacent to treatment area.

For terrestrial uses, do not apply directly to water or to areas where surface water is present or to intertidal areas below the mean high-water mark, except under forest canopy when aerially applied to control forest pests. Do not contaminate water when disposing of equipment washwaters and rinsate. Do not apply when weather conditions favor drift or runoff from areas treated.

This pesticide demonstrates the properties and characteristics associated with chemicals detected in groundwater. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

Agricultural Use Requirements

This section is found only on product labels that are covered by the EPA Worker Protection Standard (WPS). The WPS includes requirements for the protection of agricultural workers on farms and in forests, nurseries, and greenhouses, and handlers of agricultural pesticides. This section also contains requirements for training, decontamination, notification, emer-

gency assistance, personal protective equipment (PPE), and restricted-entry intervals (REI).

Restricted-entry Intervals (REI)

Many pesticide labels include a statement about a restricted-entry interval (REI). The REI specifies how much time must pass between the application of a pesticide and the reentry of unprotected workers into a treated area. The EPA sets REIs.

The REI statement can be found under the heading "Agricultural Use Requirements." If no REI or other restricted-entry statement appears on the label, then all persons should wait at least until sprays have dried or dusts have settled before reentering a treated area. If there are multiple REIs on a label, you can usually find the appropriate REI at the beginning of the use-direction section for each crop.

Under the federal Worker Protection Standard (WPS), workers must be notified about areas treated with pesticides so they may avoid inadvertent exposures.

The EPA has allowed for an exception to the WPS that permits, under specified conditions, workers to enter pesticide-treated areas during a restricted-entry interval (REI) to perform tasks that involve short-term, limited contact with pesticide-treated surfaces. This exception allows workers the flexibility to perform certain tasks during an REI that could not have been foreseen and which, if delayed, would cause significant economic loss. However, early-entry workers must wait at least four hours after the application and must be wearing the personal protective equipment (PPE) specified on the label.

Non-agricultural Use Requirements

The requirements in this section apply to pesticide uses that are not within the scope of the WPS, such as the application of pesticides to lawns, golf courses, ornamental plantings, structures (except greenhouses), aquatic areas, and rights-of-way. Specific reentry times are not generally listed for these uses, though the label often cautions people and pets not to enter treated areas until the spray has dried or dust has settled.

EXAMPLE OF AGRICULTURAL USE REQUIREMENTS

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 12 hours. Exception: if the product is applied by drenching, the Worker Protection Standard, under certain circumstances, allows workers to enter the treated area if there will be no contact with anything that has been treated.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water is:

- Coveralls.
- Waterproof gloves.
- Shoes plus socks.

Storage and Disposal

All pesticide labels contain general instructions for the appropriate storage and disposal of the pesticide and its container. State and local laws may vary considerably, so specific instructions usually are not included. One or more statements may appear in a special section of the label titled "Storage and Disposal" or under headings such as "Important," "Note," or "General Instructions." these include:

- Store herbicides away from fertilizers, insecticides, fungicides, and seeds.
- Store at temperatures above 32°F (0°C).
- Do not reuse container; render unusable.
- Do not contaminate water, food, or feed by storage or disposal.
- Triple-rinse, or equivalent, and dispose of in an approved landfill.

Seek sound advice if needed to determine the best storage and disposal procedures for your operation and location. Read this section before you purchase the product to be sure you can meet the requirements.

Directions for Use

These instructions provide the directions on how to use the product (see Figure 3.1). The use instructions will tell you:

- The pests that the manufacturer claims the product will control.
- The crop, animal, or site the product is intended to protect.
- The proper mixing instructions.
- How much to use (rate) and how often.
- How close to harvest the product can be applied (preharvest interval).
- Phytotoxicity (damage to plants) and other possible injury.
- Where and when the material should be applied.
- Recropping, composting, grazing, and other restrictions.
- How to minimize drift.

It is illegal and considered a misuse to use any registered pesticide in a manner inconsistent with its labeling. Examples of pesticide misuse include applying a pesticide to a site that is not listed on the label, applying a pesticide at a higher-than-labeled rate, and handling a pesticide in a manner that violates specific label instructions (e.g., storage near food or water, improper container disposal).

Many terms are used on labels to describe when and how to use pesticides. Many technical terms also appear in leaflets and bulletins that you may get from your local Cooperative Extension office, land-grant university, state and federal pesticide regulatory agencies, pesticide manufacturers, and professional pest management associations. Your understanding of these terms will help you obtain optimum results from pesticide applications. Refer to the glossary in this manual. If you do not understand the directions on a label, check with your pesticide dealer or salesperson, a county Extension agent, your state pesticide regulatory agency, or your professional association.

The label provides a wealth of information. Failure to follow the instructions on a pesticide label can result in a serious pesticide accident and constitutes a legal violation that may make you subject to civil or criminal prosecution. Remember, the label is a legal document. The user is liable for personal injury, crop or site damage, or pollution that occurs through misuse of a pesticide.

STATEMENT OF PRACTICAL TREATMENT

Contact a doctor (physician), clinic, or hospital immediately in cases of suspected poisoning. Explain that the victim has been exposed to galactothion and describe his/her condition. After first aid is given take victim to clinic or hospital. If breathing has stopped, start artificial respiration immediately and maintain until doctor sees victim.

If **swallowed:** If patient is conscious and alert, give 2 or 3 glasses of water or milk to drink, and induce vomiting by touching back of throat with finger. Do not induce vomiting or give anything by mouth to an unconscious person. Get medical attention.

If **on skin:** Immediately flush the skin with plenty of water while removing contaminated clothing and shoes. See doctor immediately. *Galactothion is an organophosphate pesticide that inhibits cholinesterase.*

If **inhaled:** Remove to fresh air. If not breathing give artificial respiration. Get medical attention.

If **in eyes:** Hold eyelids open and flush with a steady stream of water for at least 15 minutes. Get medical attention.

Note to Physician

Antidote — administer atropine di-sulfate in large doses. TWO to Four mg. intravenously or intramuscularly as soon as cyanosis is overcome. Repeat at 5 to 10 minute intervals until signs of atropinization appear. 2-PAM chloride is also antidotal and may be administered in conjunction with atropine. **DO NOT GIVE MORPHINE OR TRANQUILIZERS.** Galactothion is a strong cholinesterase inhibitor affecting the central and peripheral nervous system and producing cardiac and respiratory depression. At first sign of pulmonary edema, the patient should be given supplemental oxygen and treated symptomatically. Continued absorption of the poison may occur and fatal relapses have been reported after initial improvement. VERY CLOSE SUPERVISION OF THE PATIENT IS INDICATED FOR AT LEAST 48 HOURS.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS (& DOMESTIC ANIMALS)

DANGER: Fatal if absorbed through skin, fatal if swallowed, and poisonous if inhaled. Do not breathe vapors or spray mist. Do not get on skin or clothing. May be irritating to eyes and may cause mild skin sensitization. Keep away from domestic animals. Discontinue use if allergic reaction occurs.

Signs and symptoms of overexposure

Salivation, muscle tremors, nausea, watery eyes, difficulty breathing, vomiting, pinpoint eye pupils, excessive sweating, diarrhea, blurred vision, abdominal cramps, weakness, headache.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Some materials that are chemical resistant to this product are listed below. If you want more options, follow the instructions for category G on an EPA chemical resistance category selection chart.

Applicators and Other Handlers must wear:

Coveralls over long-sleeve shirt & long pants
Chemical-resistant gloves such as barrier laminate or vitron
Chemical-resistant footwear plus socks
Protective eyewear
Chemical-resistant headgear for overhead exposures
Chemical-resistant apron when cleaning equipment, mixing, or loading
Respirator with either an organic vapor-removing cartridge with a prefilter approved for pesticides (MSHA/NIOSH approval prefix TC-23C) or a canister approved for pesticides (MSHA/NIOSH approval number TC-14G)

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning and maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

RESTRICTED USE PESTICIDE

Due to very high toxicity to humans and birds.

For retail sale to and use only by certified applicators or persons under their direct supervision and only for those uses covered by the certified applicator's certificate.

VIP NO PEST GEL

ACTIVE INGREDIENT:

galactothion (0,0-diethyl methyl phosphorothiate)..... 20.9%
related isomers..... 1.1%

INERT INGREDIENTS: 78.00%

Total 100.00%

Net Contents: 5 Gallons

EPA Reg. No. 12345-10 EPA Est. 56787-CO-1

VIP Chemical Company
2527 VIP Drive
Biarspond, MI 22315

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations

Users should wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet. Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. Remove PPE immediately after handling this product. Wash the outside of the gloves before removing.

ENVIRONMENTAL HAZARDS

This pesticide is highly toxic to aquatic invertebrates and wildlife. Birds in treated areas may be killed. Shrimp and other aquatic organisms may be killed at recommended application rates. Do not contaminate water by cleaning of equipment or disposal of wastes.

PHYSICAL AND CHEMICAL HAZARDS

Do not use or store near heat or open flame. Not for use or storage in or around the home.

KEEP OUT OF REACH OF CHILDREN

DANGER  **POISON**

PELIGRO

Si Usted no entiende la etiqueta, busque a alguien para se la explique a Usted en detalle. (If you do not understand this label, find someone to explain it to you in detail.)

STORAGE AND DISPOSAL

PROHIBITIONS: Do not contaminate water, food or feed by storage or disposal. Do not store under conditions which might adversely affect the container or its ability to function properly.

STORAGE: Do not store below temperature of 0° F.

CONTAINER DISPOSAL: Never reuse empty containers. Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedure approved by state and local authorities.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

GENERAL DIRECTIONS

Spray Preparation: To assure a uniform product, agitate or shake all containers of this product prior to use. Use 50 mesh screens or equivalent slotted strainers in spray system. To prepare for spraying, fill tank to 1/2 the needed volume of water. Add the required amount of this insecticide and mix thoroughly by mechanical or hydraulic agitation. Finish filling tank with water to desired volume and thoroughly mix. Do not store spray mixture for prolonged periods. If tank mixes are to be used, VIP Pest-No must be fully dispersed in water first, followed by addition of the intended tank-mix material. DO NOT USE MIXTURES THAT CURDLE, PRECIPITATE OR BECOME GREASY.

Note: Do not add VIP No Pest to water with pH values below 3.0 or above 8.5.

DIRECTIONS FOR AERIAL OR GROUND SPRAY APPLICATION

Application timing: Begin application when insect populations reach economic threshold levels. Consult the Extension Service, professional consultants or other qualified authorities to determine appropriate threshold levels for treatment in your area.

Application Instructions: Apply a minimum finished spray volume of 2 gallons per acre by air or 5 gallons per acre by ground unless otherwise directed under crop specific directions. For best results, it is important to obtain thorough and uniform spray coverage of the plant. Use higher dosage rates for heavy infestations, large larvae, or dense foliage. The specific length of control depends on environmental factors, plant growth, dosage rate, and degree of insect infestation

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), notification-to-workers, and restricted-entry intervals. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 48 hours. The REI is 72 hours in outdoor areas where the average annual rainfall is less than 25 inches a year.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

— coveralls over long-sleeved shirt & long pants
— chemical-resistant footwear plus socks
— protective eyewear
— chemical-resistant headgear

Notify workers of the application by warning them orally and by posting warning signs at entrances to treated area

Figure 3.1 Sample pesticide label (adapted from MSU Pesticide Applicator Core Training Manual).

MATERIAL SAFETY DATA SHEETS

Material safety data sheets (MSDS) are very useful documents for learning about specific chemical and physical properties of pesticides (herbicides, insecticides, fungicides, rodenticides, disinfectants, etc.) or other potentially hazardous substances. Manufacturers of these substances are required to develop and to provide upon request a MSDS for each product. The MSDS provides detailed information about the product's composition, physical and chemical properties and hazards, toxicological and ecological information, and first-aid procedures. Commercial establishments using pesticides and other products are required to keep appropriate MSDS and make them available to workers or others who may come into contact with the substance, its diluted end product, or its residues. Because there is no standardized form for the MSDS and because the information is presented in technical terms, the MSDS can be difficult for readers to decipher without specialized scientific training. The following explains how the MSDS is derived and arranged and helps the reader interpret the information contained in it.

Ideally, the MSDS is used in combination with the pesticide label, but it should never be used in place of the actual product label.

Development of the MSDS

Pesticide manufacturers must perform a wide range of tests before their products can be registered with the U.S. Environmental Protection Agency (EPA) for use in the United States. The MSDS reflects the results of these tests on the formulated product.

The Hazard Communication Standard of the Occupational Safety and Health Act (OSHA) requires the MSDS to be made available to workers in manufacturing or to any end user who handles the end-use formulated material. MSDS readers should remember that, except for applicators, people are usually exposed to diluted products or to residues rather than to the product for which the MSDS was developed. Incidental exposure from dilute sprays does not equate to workplace exposure information presented in the MSDS, and the information should be interpreted with this in mind.

Components of the MSDS

The information contained in the MSDS may appear under various headings and does not have to follow the same order, but the elements of the MSDS are the same.

Chemical Product Identification

This section identifies the ingredients in the product by common (generic) name and percentage of the active ingredient(s) and by percentage of inert ingredients. An **inert ingredient** is simply one for which no toxic activity against the pest is claimed; the **active ingredient** is the component that actually controls the pest. Inert ingredients, however, may have effects on humans or other animals, plants, etc. The exact identification of inert ingredients is considered proprietary information, so they are not required to be listed on either a label or the MSDS. However, the EPA maintains a list of inert ingredients considered not to present excess hazards, and registrants choose from those when they formulate products. This section of the MSDS may also provide information about the class of chemical, such as "organophosphate insecticide" or "chlorophenoxy herbicide." Because chemicals in a particular class share certain characteristics, this information may be helpful, particularly to the healthcare professional. This section also often provides synonyms, i.e., brand names of other products with the same composition.

PRODUCT AND COMPANY IDENTIFICATION

Product Name: VIP No Pest Gel
Product Code: 2777A1CC
Active Ingredient: Galactothion
Chemical Family: Chloronicotinyl
Molecular Formula: $C_{12}H_{20}Cl_{12}O_3$ (galactothion)
Chemical Name: VIP 11815; 0,0-diethyl methyl phosphorothiate
Manufacturer: VIP Chemical Co.
Emergency Telephone Number: (800)111-2323

Example of chemical product identification information on a MSDS.

Physical and Chemical Properties

This section describes the product's physical appearance and provides information about how the product behaves under certain physical and chemical conditions. Particularly relevant are the measures for **solubility** in water, **vapor pressure, stability,** and **freezing/boiling point.**

Water solubility is a factor in whether a substance is likely to be carried off the site in runoff water or in leachate. In general, the lower the solubility, the more likely the substance is to bind to soil particles or organic matter rather than to dissolve in water. A relatively high solubility in water can be a benefit, however, because water-soluble products are excreted in urine rather than stored in body fat.

PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point: 212°F **Melting Point:** NI
Evaporation Rate (Butyl Acetone = 1): NI
Vapor Pressure (mm Hg.): <17 @ 78 F
Vapor Density (Air = 1): >1
Specific Gravity (H20 = 1): 1.14600
Solubility in Water: Infinite
Appearance and Odor: Brown liquid; amine odor.
Other Information:
pH = 7.5–8.0
Density = 9.63 pounds/gallon
Freezing point <35°F
Percent volatile by volume 46%

Example of a physical and chemical properties section on a MSDS for an herbicide product.

A substance's vapor pressure helps determine whether the substance is likely to volatilize, or form a gas. Other factors involved include temperature; how tightly the substance binds to soil particles, plants, or the site of application; and how much water is present (combined with the substance's water solubility). Products with relatively high volatility are more likely to be detected through smell than products with low volatility. Some MSDS provide direct information about the odor of a product. Products may range from practically odorless to very apparent.

Stability and freezing and boiling points of a substance determine whether a product can be stored over the summer or winter. Freezing and excessive heating may degrade the product, resulting in a loss of efficacy against the pest.

Fire and Explosion Hazards

Some substances can spontaneously catch on fire at a certain temperature. In such cases, the MSDS identifies the temperature, called the **flash point,** at which the substance catches fire. The MSDS may list conditions to avoid, such as materials that are incompatible with the product. For instance, some substances can react with galvanized containers to form hydrogen gas, a highly combustible material.

Toxicological Information/ Human Health Data

The MSDS identifies by what route(s) of exposure the product may be harmful (i.e., **ingestion [oral],** through the mouth; **dermal,** through the skin; and **inhalation,** by breathing in the product's vapors). The MSDS also summarizes results of toxicological tests performed on laboratory animals and extrapolates them to the potential for effects on humans. The toxicological tests required by the EPA include **acute toxicity, chronic toxicity, delayed toxicity, oncogenicity** (ability to cause tumors), **carcinogenicity** (ability to cause malignant tumors, or cancer), **teratogenicity** (ability to cause birth defects), and **fetotoxicity** (other adverse effects on the fetus, such as low birthweight or spontaneous abortion). The MSDS also lists symptoms of acute overexposure and usually lists medical conditions that may be aggravated by exposure to the product.

It is important to remember that a substance's level of acute toxicity is not related to its ability to cause chronic or delayed effects. The MSDS usually provides specific information about the product's ability to cause eye and skin irritation or allergic responses. Allergic responses are also not related to the chemical's level of acute toxicity. Thus, it is possible for a slightly toxic pesticide (Category III) to be associated with adverse long-term effects or allergic reactions and, conversely, for a highly toxic pesticide (Category I) to have no known long-term or allergic effects. (See Chapter 5 for a discussion of toxicity categories.)

Cholinesterase Inhibition

If the pesticide can inhibit **cholinesterase** (an enzyme that regulates nerve impulses), the MSDS may identify it as a cholinesterase inhibitor. Such identification was not required until recently.

Regulatory Levels and Classification

Some compounds have regulatory limits on the amount of time a worker can be exposed to them. Some substances have been classified on their ability to act as carcinogens (cancer-producing substances).

Personal Protection Recommendations

Special equipment to be worn while handling the concentrate product is specified by the MSDS. Many products do not require special protective equipment. Others require chemical-proof gloves, goggles, respirators, or other gear. Remember that the equipment listed pertains to the product as formulated. Refer to the pesticide label to check whether gear listed on the MSDS is required to be worn while handling the diluted product.

Additional Information

The MSDS must also provide information on:

- **Emergency and first-aid procedures**—provides specific information about first aid and emergency treatment for persons exposed to the product. If the chemical is a cholinesterase inhibitor, the MSDS states this and provides treatment information for the physician.
- **Ecological or environmental hazards**—provides information on acute and chronic effects on wildlife in similar terms as the statements pertaining to humans.
- **Spills, fires, and accident procedures**—provides directions for cleaning up spills and leaks, as well as special information for firefighters.
- **Storage and disposal**—provides directions on how to store and properly dispose of the pesticide. This information may range from very specific to quite general.

It is a good idea to have an MSDS available for every pesticide product that you are using. Read both the pesticide label and the MSDS for a more complete picture of the potential hazards associated with the pesticide. Both the label and the MSDS provide valuable information in case of a pesticide emergency.

SUMMARY

The language on pesticide labels is strictly regulated by the EPA in coordination with pesticide manufacturers to provide precise information on how to use pesticides correctly and safely. It is the applicator's responsibility to read, understand, and follow the label directions to ensure that pesticides are applied according to regulations. The label directions are written to instruct the applicator how to use the pesticide for effective control of the target pest while minimizing harmful effects to other organisms and the environment. Make sure the pesticide has both federal and state registration for its intended use.

Be familiar with all sections on a pesticide label and know where to find the specific directions and precautions for each pest control situation that you manage. Know both the trade and common names of the chemical you are using, and be familiar with the product's active ingredients. Signal words and symbols help the applicator recognize how toxic (i.e., dangerous) the pesticide is. These signal words are often accompanied by precautionary statements that further explain how the pesticide may cause injury and what to do to prevent it (e.g., routes of entry statements, specific action statements, protective clothing and equipment statements). Other parts of the label let the applicator know how, when, where, and on what target pest the pesticide may be applied (e.g., directions for use, mixing and loading instructions). Still other parts of the label inform users

what to do should an accident occur and what precautions to take to avoid harming themselves, other persons, the environment, or non-target organisms (e.g., practical treatment statements, environmental hazards, storage and disposal, physical or chemical hazards). All parts of the pesticide label must be carefully read and followed. The label, however, may not provide all of the information needed to avoid harmful effects of pesticides. It is a good practice to take even further precautions such as using additional protective clothing and equipment beyond what the pesticide label recommends.

Pesticide labels in combination with MSDS provide a wealth of information on the hazards associated with each pesticide. Carefully review these documents before applying any pesticide. Applicators are better prepared to avoid any harmful effects if they understand the properties of the pesticide more thoroughly. Remember, it is the applicator's responsibility to ensure that pesticides are applied effectively and as safely as possible.